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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

VERSTEEG, STEVEN H

ART UNIT	PAPER NUMBER
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1753

DATE MAILED: 10/12/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/624,384

Applicant(s)

LEYBOVICH, ALEXANDER

Examiner

Steven H. VerSteeg

Art Unit

1753

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 21 September 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-16 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-16 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 22 July 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Claim Rejections - 35 USC § 112***

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claims 10-16 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The limitations in claims 10-14 and 16 could not be located in the specification as originally filed. The step limitations of "converting..." and "forming a cloud..." could not be located in the specification as originally filed. Therefore, the subject matter is considered to be new.

### ***Claim Rejections - 35 USC § 102***

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1-5 and 10-16 are rejected under 35 U.S.C. 102(b) as being anticipated by US 5,292,122 to Katsube et al. (Katsube).
5. For claim 1, Applicant requires a method for the physical vapor deposition of dielectric material onto a substrate comprising forming an energized monochromatic ion beam; converting

Art Unit: 1753

the ion beam into an energized monochromatic beam of neutrals; directing the beam toward a sputtering target; exposing the target to bombardment by the beam; sputtering particles from the target; forming a cloud of the sputtered particles proximate to a substrate; and depositing the particles onto the substrate.

6. For claim 15, Applicant requires a method for the physical vapor deposition of dielectric material onto a substrate comprising forming an energized monochromatic ion beam; converting the ion beam into an energized monochromatic beam of neutrals by directing the ion beam through a charge transfer chamber containing a volume of relatively slower moving neutrally charged gas atoms or molecules (also the limitations of claims 10 and 12); directing the beam toward a sputtering target; exposing the target to bombardment by the beam; sputtering particles from the target; forming a cloud of the sputtered particles proximate to a substrate wherein the cloud is formed by increasing the number of collisions between gas molecules and sputtered particles to decrease the directional momentum of the sputtered particles as they propagate toward the substrate (also the limitations of claims 13 and 14); and depositing the particles onto the substrate.

7. Katsube discloses forming an ion beam; converting it to a fast atom beam; bombarding the sputtering target; forming a cloud of particles near the substrate; and depositing the particles onto the substrate (Embodiment 2). The area where the beam collides is considered a charge transfer chamber. The injected argon (col. 4, l. 23-25) is a slower moving neutrally charged gas atom. The cloud is inherently formed by increasing the collisions because the collisions would increase with an increased voltage.

Art Unit: 1753

8. For claim 2, Applicant requires the target to comprise a low-k dielectric material. For claim 3, Applicant requires the material to be organic. For claim 4, the material is inorganic. For claim 5, the dielectric constant is about 1.3 to 3.7. For claims 11 and 16, Applicant requires the ion energy to be 100-400 eV. The voltage applied by Katsube would inherently results in an electrode volt as claimed by Applicant. Katsube discloses the dielectric constant to be 2.2 for polytetrafluoroethylene (organic) at 8kv (Experiment 2) and 2.1 for Teflon (inorganic) (Experiment 4).

***Claim Rejections - 35 USC § 103***

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. Claims 6-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 5,296,122 to Katsube in view of *New high-power fast atom beam source* by Shimokawa et al. (Shimokawa).

11. For claim 6, Applicant requires a system for the physical vapor deposition of dielectric material onto a substrate comprising a sputtering target; a low energy, large aperture ion source of energized monochromatic ions; an ion optics system for equalizing, shaping, and directing ions into an ion beam; a charge transfer system for neutralization of the ion beam into a beam of neutrals; means for directing the beam of neutrals toward the target so that the beam bombards the target and causes the target to emit sputtered particles; means for forming a cloud of

Art Unit: 1753

sputtered particles proximate the substrate; and means for depositing the cloud of particles onto the substrate.

12. Katsube is described above, but does not disclose the specifics of the ion/neutral beam source. Katsube does disclose the use of a sputtering target, forming the cloud (hence the means to form it) and depositing onto the substrate (hence the means to deposit).

13. Shimokawa discloses a new fast atom beam (FAB) source that uses an electromagnet for the benefit of higher plasma densities (abstract). The FAB comprises a low energy, large aperture ion source of energized monochromatic ions; an ion optics system for equalizing, shaping, and directing the ions into an ion beam; a charge transfer system; and means for directing the beam toward the target.

14. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of Katsube to utilize the FAB of Shimokawa because of the desire to have a higher plasma density.

15. For claim 7, Applicant requires the target to comprise a low-k dielectric material. For claim 8, Applicant requires the low-k dielectric material to be organic. For claim 9, Applicant requires the low-k dielectric material to be inorganic. As noted above, Katsube discloses the limitations (Experiments 2 & 4).

#### ***Response to Amendment***

16. The double patenting warning presented in the office action mailed March 22, 2005 is withdrawn in light of the amendment.

17. The 112-second paragraph rejections of claims 7-9 presented in the office action mailed March 22, 2005 are withdrawn in light of the amendment.

Art Unit: 1753

18. The 102(b) rejection of claims 1-5 over Katsube presented in the office action mailed March 22, 2005 stands, but the rejection of claim 7 is withdrawn in light of the amendment.

19. The 103(a) rejection of claims 6, 8, and 9 over Katsube in view of Shimokawa presented in the office action mailed March 2, 2005 stands, and a new rejection of claim 7 has been added necessitated by Applicant's amendment.

### ***Response to Arguments***

20. Applicant's arguments filed September 21, 2005 have been fully considered but they are not persuasive.

21. Applicant has argued that Katsube is forming a hydrophobic film and thus, not a dielectric as claimed by Applicant. I agree to an extent. Katsube does expressly state that a hydrophobic layer is formed, but Katsube also expressly states that the resulting product (which consists of a substrate, hydrophobic layer, and metal layer) has a dielectric constant. Thus, there are inherently some dielectric properties to the hydrophobic layer. It is the dielectric properties that cause the hydrophobic layer to meet the limitations.

22. Applicant then argues that Katsube does not form a cloud of sputtered particles. I disagree. The beam bombards the argon atoms and forms a plasma cloud.

### ***General Information***

For general status inquiries on applications not having received a first action on the merits, please contact the Technology Center 1700 receptionist at (571) 272-1700.

For inquiries involving Recovery of lost papers & cases, sending out missing papers, resetting shortened statutory periods, or for restarting the shortened statutory period for response, please contact Denis Boyd at (571) 272-0992.

Art Unit: 1753

For general inquiries such as fees, hours of operation, and employee location, please contact the Technology Center 1700 receptionist at (571) 272-1300.

***Conclusion***

23. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Steven H. VerSteeg whose telephone number is (571) 272-1348. The examiner can normally be reached on Mon - Thurs (6:30 AM - 5:00 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam X. Nguyen can be reached on (571) 272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.



Art Unit: 1753

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Steven H VerSteeg  
Primary Examiner  
Art Unit 1753

shv  
October 6, 2005